NEWTON'S 3RD LAW

12 INQUIRY STATIONS

Sprinters

When you watch a group of sprinters line up for the 100 meter dash, you will notice that most of them use 'blocks', which are the things that are anchored in the ground that the sprinters push off from when they start the race. These blocks must help the runners, otherwise the sprinters would not use them, so…

In terms of Newton's 3rd law, how do these blocks help the sprinters?

SWIMMING FISH

How does a fish move through the water? Think of how their fins push on the water.

In terms of Newton's 3rd law, how do the fins of the fish interact with the water?

What is the action? What is the reaction?

SPRING SCALES

Use the hooks to connect the two spring scales together. Have each person hold one end of a spring scale. Have one person try to pull gently with a force of 2 Newtons and have one person try to pull with a force of 8 Newtons.

In terms of Newton's 3rd Law, Is it possible to have one person pull with a force of 2 newtons while the other person pulls with a force of 8 newtons? Explain using Newton's 3rd Law. What is the action? What is the reaction?

CAN YOU CANOE?

Explain how paddling a canoe allows the canoe to travel forward using Newton's 3rd law. Think of how your paddle moves through the water and how the canoe responds to the motion of the paddle.

In terms of Newton's 3rd law, how does the paddle interact with the water? What is the action? What is the reaction?

Firemen

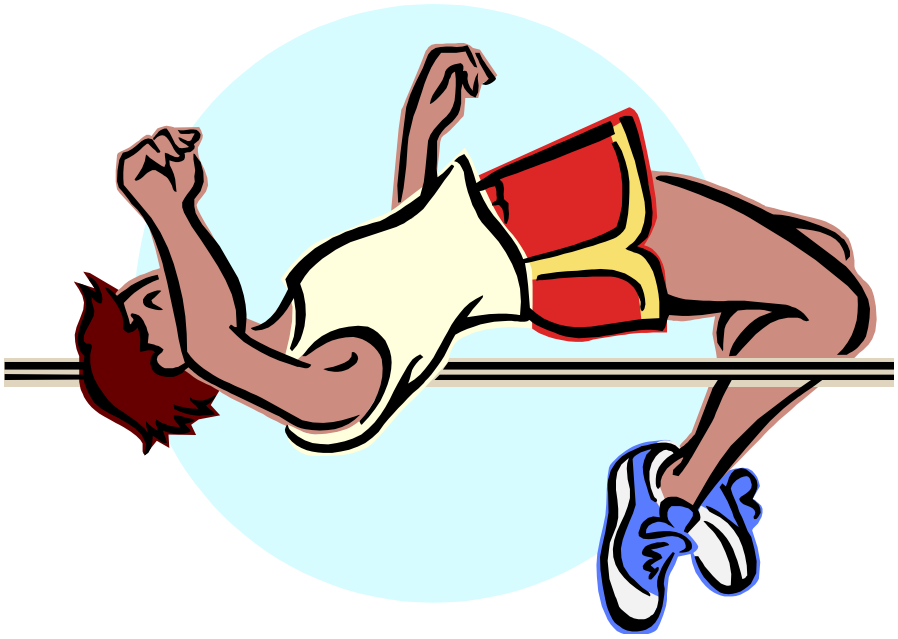
Why does it take several fireman to hold the high pressure water hose when putting out a fire?

In terms of Newton's 3rd law explain the interaction of the water coming out of the hose and the number of fire fighters it takes to hold the hose? What is the action? What is the reaction?

HIGH JUMPING

Explain how an athlete is able to perform the high jump using Newton's third law. How does getting a running start allow the jumper to jump higher?

In terms of Newton's 3rd law, what is the interaction between the ground and the runner that allows the high jumper to jump high? What is the action? What is the reaction?



BASEBALL

Explain how a catcher or batter in baseball uses Newton's 3rd law.

In terms of Newton's 3rd law what is the action? What is the reaction?

BALLOON RACES

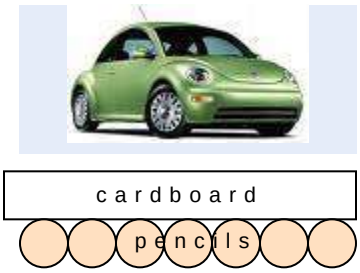
Have each partner blow up one balloon, but do not let the air out and do not tie off the balloon. Line up the balloons (yours and your partners) so that when you release the balloons they will travel in the same direction.

Release the balloons at the same time. The winning balloon is the balloon that travels the farthest!

In terms of Newton's 3rd law, explain why one balloon traveled farther than the other.

WHEN FINISHED YOU MUST SHOW ME WHEN YOU THROW AWAY YOUR BALLOONS! ☺

1. Line up 10 pencils next to each other in a row (side-by-side).
2. Place the piece of cardboard on top of the pencils
3. Place the car on a flat surface and pull it back several times to wind up the car.
4. Place the car on the cardboard and let it go!

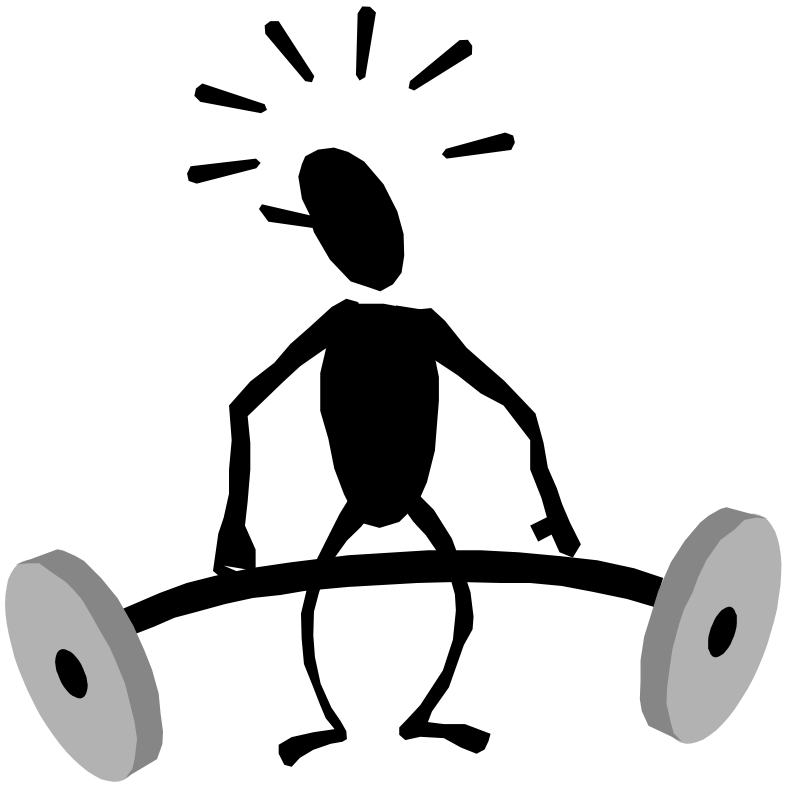


In terms of Newton's 3rd law, what is the action? What is the reaction? Describe the action of the car. Describe the action of the cardboard. Why did the car and the cardboard move in this manner?

How many newtons?

Hold one spring scale up and hook 1 mass onto it. Record how many newtons it takes the spring scale to hold up the mass. Then add 1 more mass to the spring scale. Now how much force is required to hold two masses?

In terms of Newton's 3rd law, what is the action? What is the reaction? Explain the resulting force as you added more mass.



Soda Can Sprinkler

1. Dunk the can with holes down ONE side in the bucket to fill it with water. Then remove the can from the water, holding the can by the string. Keep the can hanging over the sink and observe how the can moves.
2. Now dunk the can with holes all around the bottom of it in the water. Again remove it, hold it by the string and observe the motion of the can.

In terms of Newton's 3rd law, what is the action? What is the reaction? Explain the motion of the can as the water flows out the holes in one side. Explain the motion of the can as the water flows out of the holes in the can.

Books

Place 2 books in your partners hands PALMS SIDE UP. Then, quickly add 8 more books onto their palms. What happens to the person's hands? How do your hands react? What is the action? What is the reaction? Explain using Newton's 3rd law.

Name _____

FOR EVERY ACTION…

At each station read the scenarios given and complete the tasks if necessary. Then explain the motion you observed using Newton's 3rd Law. (What is the action? What is the reaction?) Answer the questions below for each station. **As a reminder…write down Newton's 3rd Law below!**

NEWTONS 3RD LAW _____

_____

_____

STATION 1: SPRINTERS

The blocks must help the sprinters otherwise they wouldn't use them; so how do the

blocks help the sprinters? _____

_____

_____

What is the action?_____

What is the reaction? _____

STATION 2: SWIMMING FISH

In terms of Newton's 3rd Law, how do the fins interact with the water? _____

_____

_____

What is the action?_____

What is the reaction? _____

STATION 3: SPRING SCALES

In terms of Newton's 3rd Law, Is it possible to have one person pull with a force of 2 N while the other person pulls with a force of 8 N? _____

Explain using Newton's 3rd law. Hint…what was the action? What must the reaction be? _____

_____

_____

STATION 4: BASEBALL

Explain how a catcher or batter in baseball uses Newton's 3rd law. (you choose catcher or batter) _____

_____

_____

What is the action?_____

What is the reaction? _____

STATION 5: CAN U CANOE?

In terms of Newton's 3rd Law, how does the paddle interact with the water?

_____

_____

_____

What is the action?_____

What is the reaction? _____

STATION 6: WATCH IT GO!!!

What happens to the car? _____

What happens to the cardboard? _____

What is the action?_____

What is the reaction? _____

Why doesn't the ground go in the opposite direction of your car as it starts to move?

_____

_____

STATION 7: FIREMEN

Why does it take several fireman to hold the high pressure water hose when putting out a fire? _____

_____

_____

What is the action?_____

What is the reaction? _____

STATION 8: BALLOON RACES:

Explain why the balloon travels as it does using Newton's 3rd law. _____

_____

_____

Explain why one balloon went farther than the other. _____

_____

What is the action?_____

What is the reaction? _____

STATION 9: HOW MANY NEWTONS?

Force required to hold 1 mass: _____

Force required to hold 2 masses: _____

What is the action?_____

What is the reaction?_____

STATION 10: HIGH JUMPIN'

In terms of Newton's 3rd law, what is the interaction between the ground and the runner that allows the high jumper to jump high? _____

_____

How does getting a running start allow the jumper to jump higher?_____

STATION 11: SODA CAN SPRINKLER

Explain why the can spins in one direction while water is flowing out. And then reverses direction when the can is empty. _____

_____

What is the action? _____

What was the reaction? _____

STATION 12: BOOKS

What is the action?_____

What is the reaction? _____

Why was the reaction different with 8 books rather than 2? _____

_____

FOR EVERY ACTION...

TEACHER DIRECTIONS

MATERIALS: Car that winds as you pull it back, pencils, cardboard, 2 soda cans, string, bucket of water, 1 balloon for each student, tape for a 3 spring scales, hanging masses, 10 books,

DIRECTIONS: Place the cards and materials out at different stations. Give students adequate time (I do 2 45 minute periods) to get around to each station. They read the information and answer the questions based on Newton's 3rd law: **FOR EVERY ACTION, THERE IS AN EQUAL AND OPPOSITE REACTION**